Before the

FEDERAL COMMUNICATIONS COMMISSION

Washington, D.C. 20554

ORIGINAL FILE

In the Matter of	)	RE: FCC 88-288
	)	
Advanced Television Systems and their Impact on the Existing Television Broadcast Service	)	
	)	**MM Docket No. 87-268**
Review of Technical and Operational Requirements: Part 73-E, Television Broadcast Stations	)	
	)	
Reevaluation of the UHF Television Channel and Distance Separation Requirements of Part 73 of the Commission's Rules	)	

COMMENTS OF A-VISION™

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1. INTRODUCTION

1.1 A-VISION™, an ATV proponent engaged in the development of advanced television (ATV) and media related systems, hereby submits the following comments relative to the Tenative Decision and Further Notice of Inquiry (Further Notice or FN) in MM Docket No. 87-268 released by the Commission on September 1, 1988.

1.2 The work of the FCC is very important to the collaborative efforts currently underway in seeking the goals of Advance Television for the U.S. viewers (and others around the world). There is no single solution, to date, which addresses all facets of the technologically challenging problems associated with ATV, and, as such, there is no single vendor of either hardware or research approaches that seems likely to dominate the marketplace. Rather, it is the collaborative efforts of many individuals and organizations making their respective contributions toward a common set of goals.

1.3 Through our participation in the various ATV and HDTV committees, Subcommittees and Working Parties, A-VISION™ has been privileged to work together with our colleagues from around the world, and to gain new insights into the multi-leveled complexity of ATV. We wishes to share with our colleagues in the television industry our comments about ATV, and in particular, the A-VISION™ family of technology-based solutions that are being disclosed in further detail soon, following formal Patent Filings.

1.4 A-VISION™ ATV systems and technologies are designed for terrestrial broadcast service, and are applicable to terrestrial broadcast, fiber optic, satellite, VCR, and cable distribution media. The A-VISION™ **A1**™ and **A2**™ ATV systems will be briefly described. Detailed technical descriptions for each of the A-VISION™ systems will be provided upon written request.

1.5 The first few comment questions raised in above referenced Further Notice (which hereafter will be designated as FN) included seeking additional information on ATV systems being designed for terrestrial broadcast, and their use within existing spectrum allocations. Accordingly, the A-VISION™ **A1**™ and **A2**™ ATV systems for terrestrial broadcast within the existing allocations will be described next.

2. THE A-VISION™ A1™ and A2™ ATV SYSTEMS RE: FN ¶5-2

2.1 THE A-VISION™ A1™ NTSC COMPATIBLE ATV SYSTEMS

A-VISION ™ has under research and development the A-VISION ™ **A1™** Family of Single Channel 6 MhZ Systems which are for single channel NTSC compatible terrestrial broadcast. These ATV systems are NTSC compatible and provide significantly improved audio and video performance.

Additional Features include:

- improved resolution, up to 1K by 1K compatibly within 6 MHz
- reduction of artifacts
- supports interlaced or progressive scanning modes of both sources and displays (progressive is ordinarily preferred)
- supports multiple modes of operation

2.2 THE A-VISION™ A2™ SPECTRUM COMPATIBLE ATV SYSTEMS

A-VISION ™ also has under research and development the A-VISION ™ **A2™** Family of Single Channel 6 MhZ Systems which are for single channel spectrum compatible terrestrial broadcasting in a spectrum that contains NTSC-used channels. The **A2™** systems are 6 MhZ, are not NTSC compatible, but are spectrum compatible, and therefore provide even more significantly improved audio and video performance than an NTSC compatible system can. **A2™** systems propose using a center of the channel Quadrature Modulated Carrier similar to that proposed and used by both MIT and by Zenith. The **A2™** systems proposes the use of AM-DSB supressed carrier modulation of quadrature carriers by pairs of components as Zenith has proposed. For spectrum compatibility in an NTSC environment, the vertical and horizontal scanning parameters are carefully selected to be in a controlled relationship with the corresponding NTSC parameters so as to preserve spectrum compatibility in an NTSC environment, as was carefully done in the Zenith Spectrum Compatible HDTV system.

Additional Features include:

- improved resolution, up to $1K^{+}$ by 2K compatibly within 6 MHz
- reduction of artifacts
- aspect ratio options from current standard 4:3 aspect ratios to wider aspect ratios of 5:3, 16:9, to 2:1.
- supports interlaced or progressive scanning modes of both sources and displays (progressive is ordinarily preferred)
- supports multiple modes of operation

2.3 HDTV ATTRIBUTES

Each of the five key ATV issues and HDTV attributes, often cited as the differences between true HDTV and conventional television, are addressed by the A-VISION™ ATV systems, **A1™** and **A2™**; namely:

1) **Significantly improved picture definition** (ie, movie quality) with more than doubled horizontal and vertical detail or resolution,

2) **Significantly improved audio** - CD quality multi-channel sound,

3) **Larger television screen sizes** and supporting image quality,

4) **Wider aspect ratio** theater-like screen shape, and

5) **Improved noise performance** and reduction of artifacts found in the current television systems.

2.4 ATV SYSTEM ATTRIBUTE MATRIX SUMMARY

In the FCC Advisory Committee's June 16, 1988 Interim Report in section 3.1, an excellent summary and example of the format of the ATTRIBUTES/SYSTEMS MATRIX document (PS/WP1-030) was provided, along with a short example list of some of the key attributes from the longer Attributes List of over a hundred possible attributes.

The matrix provides the opportunity to compare the attributes of the various ATV systems with the NTSC System on one hand, and with example references of high performance TV (such as the studio and production standards) and of high performance film (such as 35mm film and 70mm Showscan film) on the other hand.

The concice and convenient example of the attribute matrix summary in the interim report suggested the preparation of a similar attribute matrix summary to compare the ATV system attributes of the A-VISION™ **A1™** and **A2™** systems with NTSC and other systems. Accordingly, a copy of the relevant attribute matrix summary that was prepared has been included next.

ATV SYSTEM ATTRIBUTE MATRIX SUMMARY

ATTRIBUTE MATRIX SUMMARY	ATV SYSTEMS			
ATTRIBUTE	**NTSC**	A-Vision™ **A1™**	A-Vision™ **A2™** ...	**HDTV Studio Standards**
Compatibility with:				
NTSC Receiver	**Yes**	**Yes**	**No**	**No**
VCR (1-NTSC; 2-HDTV)	**Yes**	**Yes**[1]	**Yes**[2]	**No**
Channel	**Yes**	**Yes**	**Yes**	**No**
Other ATV Sys	**Yes**	**Yes**	**Yes**	**--**
No. of Channels Req.	**1**	**1**	**1**	**5+**
Channel Bandwidth	**6 MhZ**	**6 MhZ**	**6 MhZ**	**30-60 MhZ**
Need for contiguous channels	**No**	**No**	**No**	**Yes**
Large display size	**No**	**Yes**	**Yes**	**Yes**
Aspect Ratios	**4:3**	**4:3,16:9**	**16:9+**	**16:9**
Vertical Resolution	**330+**	**500+**	**1000**	**480-750-960**
Horizontal Resolution	**330+**	**1000+**	**2000**	**1000-1920**
Dynamic Resolution	**240+**	**240+**	**240+**	**--**
CD Audio Quality	**No**	**Yes**	**Yes**	**Yes**
Both interlaced or progressive scanning	**No**	**Yes**	**Yes**	**Yes**
Multiple modes	**No**	**Yes**	**Yes**	**--**

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2.5 COMPATIBILITY WITH EXISTING ALLOCATION OPTIONS

2.5.1 The A-VISION™ A1™ system - Option (a)

RE: FN ¶ 5-3

The A-VISION™ A1™ system provides ATV the within the existing single channel 6 MHz assignments, providing high definition television within NTSC compatibility. The obvious economic advantage to such implementation is the ability to use existing installation common to all major broadcast markets within the United States, where the availability of 3 MHz or 6 MHz augmentation is not currently feasible or desireable as may be the case for broadcasters within such cities as New York and Atlanta.

The single channel 6 MHz NTSC compatible systems are of primary interest to, the networks, their affiliates, and other terrestrial broadcasters, because it offers the lowest-cost entry point into the ATV market, while protecting their economic interests from incursion by competing media.

The A-VISION™ A1™ System provides a technological solution that could support the rapid introduction of ATV to the American market by substantially improving screen resolution within the present 6 MHz channel and still be compatible with NTSC.

2.5.2 The A-VISION™ A2™ system - Option (c)

By providing each broadcaster an additional 6 MhZ, the A2™ family of system products can provide either an independent and separate, and powerful 6 MHz very high performance ATV signal or the means to utilize the additional 3 MHz (option-b) or 6 MHz (option-c) as **an augmentation signal for the A1™ NTSC compatible system.** The benefit of the A-VISION™ **A2™** System will be enhanced screen resolution on the order of 2K, viewable in the static or slowly varying portions of the screen image. The **A2™** System will provide 35-mm quality of image, comparable to film and still photography.

2.6 THE A-VISION™ INTEGRATED FAMILY OF MULTIPLE-MODE ATV SYSTEMS

The A-VISION™ ATV Family™ uniquely provides a clear choice for reaching resolutions of up to $1K^{+}$ by 2K, with selections from among several operational modes and systems:

1) A-VISION™ **A1**™ ATV System delivering up to 1K+ resolution within a 6 MHz NTSC-compatible system.

2) **A2**™ provides up to 2K resolution in a spectrum-compatible system, similar to the Zenith proposed spectrum compatible approach. Applications could include Space exploration technology (NASA), advertising, hard copy broadcast delivery, the creative arts and "telemedicine".

A2™ can have different modes of operation. It can be used as a separate 6 MhZ high definition program delivery system, as a separate high definition SimulCast Channel, and in an **A1**™/**A2**™ augmentation mode.

For certain special events, such as the Olympics television coverage, the ability of **A1**™ and **A2**™ to work both as two stand-alone 6 MhZ independant delivery channels, as well as function simultaneously in a combined **A1**™/**A2**™ augmentation mode might be of interest for even higher combined channel capacity. performance at special locations by using both 6 MHz channels (one of which is the **A1**™ 6 MhZ NTSC-compatible channel, the other being the **A2**™ spectrum-compatible HDTV channel). The most common metaphor would be the present public television and network use of SimulCast of FM radio broadcast with special television productions, primarily those that are music based.

The advantage found in **A2**™ is that it can have either of the operational modes, switchable between a dual non-compatible ATV delivery mode or an augmentation mode that is gained through the combined resources of the **A1**™ and **A2**™ channels. Even more powerful system performance therefore makes it possible to accomodate, for example, special broadcast events with a large number of CD-Audio channels, and higher video attributes (perhaps increased color range, or extra resolution support for extra-large screens).

The motion picture film industry provides additional video performance quality points of reference with 35 mm and 70 mm film. ATV HDTV performance is often compaired with 35 mm film as a performance goal, and as potentially interchangeable media. A-VISION™ is engaged in the development of ATV systems that handle up to this video performance quality, and higher. On the high end is the 70mm Showscan™ film technology, with 60 frames/sec., displayed on a large (2:1) aspect ratio floor-to-ceiling screen, with six channels of very high quality audio. A-VISION™ is developing ATV technology and systems that are extensible up to this Showscan™ level of performance.

3 GLOBALLLY COMPATIBLE ATV SYSTEMS RE: FN ¶ 21

Another area of crucial importance to ATV is compatibility with global standards, including world-wide HDTV production standards.

3.1 COMPATIBILITY AND WORLD-WIDE PRODUCTION STANDARDS

Although present ATV systems and world-wide production standards as now proposed would not at first seem to have the degree of compatibility that would encourage international agreement on a single world-wide HDTV production standard (or heirarchy of compatible or extensible standards), the difficult goal is technically possible if its development is properly funded. A-VISION™ has significant new technology in this area to meet such goals.

3.2 GOALS AND ATTRIBUTES OF GLOBALLY COMPATIBLE ATV SYSTEMS

From a global perspective, the first goals of globally converging compatible architecture systems (as suggested in the November 17,1987 FCC NOI Comments by A-VISION ™ and in part restated here) are as follows:

- A primary goal and requirement of the global system architecture should be the evolutionary compatible convergence of the various significant systems (television, film, computer graphics and related media systems) toward a common globally-compatible but extensible open-architecture integrated system.

- The advanced television global system architecture (ATV GSA) system should be compatible with the human visual system, compatible with and extensible to NTSC and other existing and anticipated systems, and be bandwidth efficient, friendly, and cost effective.

- The ATV GSA should not only provide the anticipated video/audio performance quality improvements with artifact-free, flicker-free TV display, but also should provide a way to more easily integrate any of the present global systems (both the 525-line NTSC systems and the 625-line systems), as well as more easily accommodate **any** of the various frame rates of the television, film and computer graphics related industries (including, for example, 24, 25, 29.97, 30, 50, 59.94, 60, 66, 72 Hz and other frame rates).

3.3 A-VISION™ FRAME-RATE INDEPENDANT™ ATV TECHNOLOGIES

A-VISION has been actively developing just such ATV technologies and systems, but is interested in exploring collaboration to secure the necessary funding to make them available to the industry.

With a good bridge between the 525-line and 625-line worlds, and in particular, with good bridges for the 50 Hz / 60 Hz issues, the 50 Hz / 59.94 Hz issues, and the 59.94 Hz / 60 Hz issues, many of the current ATV problems can be solved, and powerful globally compatible systems can be designed and implemented.

3.4 LACK OF COMPATIBILITY WITH THE VARIOUS PROPONENT SYSTEMS

The present proposed standards, without some kind of technology such as that just outlined, provides a disarray of incompatible and sometimes unfriendly options that includes 1125/60, 1250/50, 1050/59.94/2:1, 525/59.94/1:1, 1050/59.94/1:1, as well as the differing frame rates of film. Most proponent systems might have some difficulty with the incompatible standards of available equipment, although the problems are hardly unique to just ATV system proponents. The problems could be eased with the above described technology.

4 ADDITIONAL BRIEF COMMENTS

4.1 ATV AND NTSC STANDARDS

RE: FN ¶ 5-4

The opportunity for thorough development, experimentation and testing of ATV including modified NTSC systems should be provided. Therefore carefully relax NTSC standards early to permit the early testing of alternatives such as the **A1**™ and **A2**™ systems. If the more efficient and more powerful systems such as **A2**™ seem more desireable, then a long term phase out of the NTSC constraints could be considered.

4.2 SPECTRUM

RE: FN ¶ 5-5

Early spectrum availability for testing should be accomodated.

4.3 ADJUSTMENTS

RE: FN ¶ 5-6

In order to encourage the prompt and efficient introduction of ATV, the possibility of making adjustments of service areas should be left open.

4.4 OPEN ARCHITECTURE AND RECEIVER COSTS RE: FN ¶ 119

Hopefully the receiver and monitor manufacturers can find cost-effective ways to provide sufficient powerful modular interfaces, consider options such as multi-sync. monitors, and find ways to profitably market these capabilities as advantages in markets that are appropriate.

4.5 TIMING OF ADOPTION OF STANDARDS RE: FN ¶ 120

Sufficient funding for the development of the powerful new ATV technologies needs to be provided first. Some of the potentially most powerful technologies seem to be coming from some of the least well funded groups. Next, sufficient time for development and testing. After thorough testing of really superior ATV technologies, we would then be in a good position to select and adopt significantly better standards.

4.6 ATV TRANSMISSION STANDARDS RE: FN ¶ 122-1

Working toward a common ATV transmission system standard, both globally and domestically, is highly desirable. But until there is better support, both financially and politically, for a better common standard, as well as sufficient time with proper funding to solve the tough engineering problems involved, it is probably still too early to determine exactly what that desired standard would be.

4.7 ATV STANDARDS AND RECOMENDATIONS RE: FN ¶ 122-4

Recommendation(s) for the near term would be more appropriate than a standard (at least until a more globally common system could be developed, tested, and accepted), given the extent of ATV technology development globally, and the global number of systems and proposals being developed, investigated, and evaluated.

4.8 OPEN ARCHITECTURE RE: FN ¶ 122-5

The open architecture should be a way to provide extensibility into the future, and not be an alternative or a substitute for evolving a good system architecture. Hopefully the preferred systems as they evolve both have extensibility for the future as well as potentially allow the presently used global systems to better integrate and converge toward more powerful common systems. Similarly, hopefully the open architecture receiver is not a substitute for the evolving standards setting, but rather a powerful implementation option with a great deal of future reach.